--This application is a continuation of application serial no. 10/071,971, entitled "VARIABLE SPEED WIND TURBINE GENERATOR," filed February 5, 2002, which is a divisional of application serial no. 09/640,503, entitled "VARIABLE SPEED WIND TURBINE GENERATOR," filed August 16, 2000, which is a divisional of application serial no. 08/907,513, entitled "VARIABLE SPEED WIND TURBINE GENERATOR," filed August 8, 1997 and assigned to the corporate assignee of the present invention.--

IN THE CLAIMS

Please cancel claims 10-56. Please add claims 57-76.

Please amend the following claims.

1. (currently amended) A variable speed wind turbine system comprising:

a wound rotor induction generator;

a torque controller coupled to the generator to control generator torque using field oriented control wherein the torque controller comprises a troque command generator to generate a torque command and a rotor current torque generator coupled to the wound rotor inductor generator to generate a rotor current torque component in response to the torque command;

a rotor current generator, coupled to the wound rotor inductor generator, to generate a rotor current flux component in response to the power factor control; and

a pitch controller coupled to the generator to perform pitch regulation based on generator rotor speed and operating independently of the torque controller.

2. (original) The system defined in Claim 1 wherein the pitch controller comprises a proportional, integral derivative (PID) pitch controller.

3. (original) The system defined in Claim 1 wherein the pitch controller comprises a proportional, integral (PI) pitch controller.

4. (original) The system defined in Claim 1 wherein the pitch controller comprises a proportional, derivative (PD) pitch controller.

5. (original) The system defined in Claim 1 wherein the pitch controller comprises a Lag-Lead controller.

6. (original) The system defined in Claim 1 wherein the pitch controller comprises a Lead-Lag controller.

7. (original) The system defined in Claim 1 where the pitch controller comprises an open loop controller with a derivative term.

8. (original) The system defined in Claim 1 wherein the wound rotor induction generator comprises a non-slip ring induction generator.

9. (original) The system defined in Claim 1 wherein the torque controller comprises a dampening filter to reduce commanded torque based on detected oscillation motion between turbine blades and the generator.

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57. (new) The system defined in Claim 1 wherein the torque controller controls the generator power and torque as a function of generator speed.

58. (new) The system defined in Claim 1 wherein the torque controller controls the generator power from a power look up table (LUT) as a function of generator speed using field oriented control (FOC).

59. (new) The system defined in Claim 1 wherein the torque controller comprises a look up table (LUT) of power and corresponding generator rotor speeds, and wherein the torque controller interpolates the LUT using a measured generator rotor speed to determine a target output power, from which the torque controller determines a desired generator torque using the measured generator rotor speed.

60. (new) The system defined in Claim 59 wherein the torque controller causes the generator to follow a predetermined power-speed curve encoded in the LUT.

61. (new) The system defined in Claim 1 wherein the torque controller comprises:

a LUT encoding a predetermined power-speed curve, wherein the LUT outputs a target output power in response to a measured generator rotor speed;

a comparator to generate a power error indication based on a comparison of actual output power to the target output power;

a proportional, integral (PI) controller coupled to the power error indication to generate an adjusted actual output power in response to the calculated power error indication; and

a divider to generate a commanded torque in response to the measured generator rotor speed and the adjusted actual output power.

62. (new) The system defined in Claim 61 further comprising a feedforward dampening term filter coupled to change the commanded torque in response to the measured generator rotor speed.

63. (new) The system defined in Claim 1 wherein the torque controller controls generator torque by commanding a required rotor current vector which interacts with an identified flux vector to produce a desired generator torque.

64. (new) The system defined in Claim 1 wherein the torque controller controls torque at least from cut-in to rated wind speeds.

65. (new) The system defined in Claim 1 wherein the torque controller controls torque from cut-in to rated wind speeds.

66. (new) The system defined in Claim 1 wherein the torque controller causes the generator to follow a predetermined power-speed curve.

67. (new) The system defined in Claim 1 wherein the torque controller commands a preselected constant torque to slow the wound rotor.

68. (new) The system defined in Claim 67 wherein the preselected constant torque comprises a maximum preselected constant torque.

69. (new) The system defined in Claim 1 further comprising a generator speed indication coupled to inputs of the torque controller and the PID controller.

70. (new) The system defined in Claim 1 wherein the torque controller operates independently of the PID pitch controller.

71. (new) The system defined in Claim 1 wherein the PID pitch controller comprises a closed loop PID controller with pitch angle being fed back.

72. (new) The system defined in Claim 1 wherein the PID pitch controller comprises an open loop controller with a derivative term.

73. (new) The system defined in Claim 1 wherein the PID pitch controller generates a pitch velocity to perform pitch regulation.

74. (new) The system defined in Claim 1 further comprises a wind turbine having at least one blade coupled to the generator, and wherein the PID pitch controller controls generator rotor speed by pitching said at least one blade.

75. (new) The system defined in Claim 74 wherein the PID pitch controller pitches said at least one blade based on a difference in actual generator rotor speed and commanded generator rotor speed.

76. (new) The system defined in Claim 1 further comprising:

a comparator to generate speed error indication based on a comparison between a measured generator rotor speed and a target generator rotor speed, and wherein the PID pitch controller generates an output pitch velocity value in response to the speed error indication; and

a non-linear LUT coupled to output a command voltage to drive a proportional valve to effect pitching action in response to the pitch velocity value.